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A STUDY OF THE PROGRAM MANAGEMENT RESPONSIBILITY  
TRANSFER PROCESS FOR THE F-16

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September 1975

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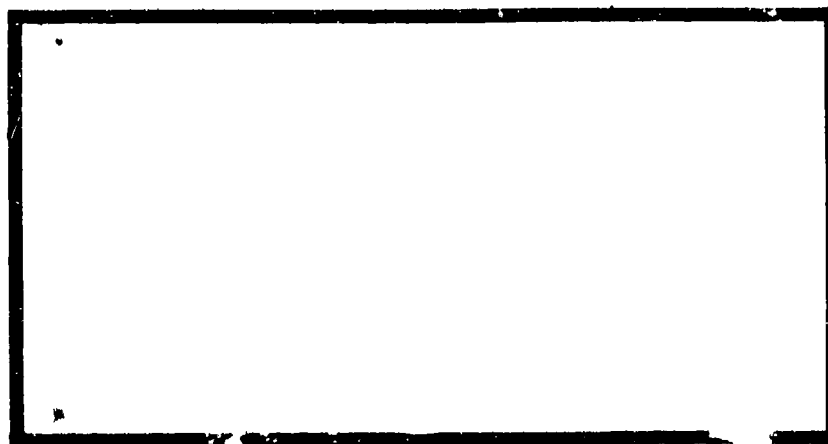
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A STUDY OF THE PROGRAM MANAGEMENT  
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THESIS

GSM/SM/75S-8

John W. Rominger  
Captain USAF

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TRANSFER PROCESS FOR THE F-16

THESIS

Presented to the Faculty of the School of Engineering  
of the Air Force Institute of Technology  
Air University  
in Partial Fulfillment of the  
Requirements for the Degree of  
Master of Science

by

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Graduate Systems Management  
September 1975

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Preface

The subject of transition, now called Program Management Responsibility Transfer, interested me from the moment I first became aware of its existence. The concept seemed simple enough: on some predetermined date, the System Program Office would turn over control of the system (in my case the F-111) to the System Manager. The regulations seemed to be adequate. Certainly the people on both sides were well qualified. Why was it such a traumatic experience? After only a few months of study in the Graduate Systems Management program, some of the possible reasons why transition was so difficult were revealed to me in the course work. This thesis is the result of over two years of working and studying transition problems. During that time my thoughts and beliefs have changed considerably, especially during the past few months. It is my hope that this thesis will enable the F-16 program managers to avoid some of the problems that have plagued previous transition events.

I would like to thank my advisor Captain Robert Tripp and my reader Lieutenant Colonel Roger Manley for their assistance. I am grateful for the expert typing help of Mrs. Phyllis Reynolds. I am indebted to the gentlemen listed in the Appendix for their honesty and candor.

John D. Rominger

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List of Acronyms

AFER	Air Force Engineering Responsibility
AFLC	Air Force Logistics Command
AFR	Air Force Regulation
AFSC	Air Force Systems Command
AGE	Aerospace Ground Equipment
ALC	Air Logistics Center
AMA	Air Materiel Area
AMC	Air or Army Materiel Command
AQ	Acquisition Logistics Directorate
ARDC	Air Research and Development Command
ASD	Aeronautical Systems Division
CCB	Configuration Control Board
DCS	Deputy Chief of Staff
DOD	Department of Defense
DPML	Deputy Program Manager for Logistics
DSARC	Defense Systems Acquisition Review Council
ECP	Engineering Change Proposal
EN	Deputy for Engineering (ASD/EN)
ETP	Engineering Transfer Package
FLU	First Line Unit
HQ	Headquarters
IG	The Air Force Inspector General
IM	Item Manager

LCC	Life Cycle Cost
MDS	Mission, Design, Series
MM	Materiel Management
MTBF	Mean Time Between Failure
PMD	Program Management Directive
PMR	Program Management Responsibility
PMRT	Program Management Responsibility Transfer
PMRTD	Program Management Responsibility Transfer Date
RIW	Reliability Improvement Warranty
RMB	Retrofit Management Breakpoint
SED	Service Engineering Division
SM	System Manager
SPD	System Program Director
SPO	System Program Office
TLSC	Total Logistic Support Cost
WSPO	Weapon System Project Office

Abstract

The management of modern, sophisticated, expensive aircraft weapons systems is not a simple task. Program managers are under constant pressure to stabilize or reduce costs, meet production and test schedules, and insure that all performance specifications are achieved. The basic organizational structures of the Air Force, however, require that one more obstacle to efficient management be overcome. At some point in the life of the system, the responsibility for managing the system must transfer from Air Force Systems Command to Air Force Logistics Command.

In the past (pre-1975) this switchover was called transition. During the 1950s, 1960s and early 1970s the process evolved into a cumbersome set of procedures that were widely misunderstood at the working levels of both commands. In 1974 the Air Force Inspector General evaluated the transition process throughout the Air Force and made several recommendations to streamline the process. The motive was cost effectiveness, the argument being that two separate and overlapping program offices were both trying to manage the system during the protracted transition period.

Some of the recent changes to the transition process are a direct result of the Inspector General's findings.

A new directive, AFR 800-4 dated 10 March 1975, prescribes a new concept: Program Management Responsibility Transfer. There are also new procedures which should reduce the overlap between the commands. In addition, changes have been made at Air Force Logistics Command that could make the transfer work more smoothly. The first system to enjoy these benefits to the fullest is the F-16.

The purpose of this thesis is to examine the history of transition and enumerate the problems which have troubled previous systems. A set of criteria, based partly on the applicable regulations, partly on the principles of management, and partly on the opinions of experts in the field, were established. The problems are compared against the criteria and solutions were obtained. The solutions were subjected to the reality of the current PMRT environment and the result was some recommendations for the F-16.

The Air Force has been extremely effective in producing the best weapon systems available in the free world. The F-16 promises to be at least as successful as its predecessors. The objective now is to produce not only effectively but also efficiently. It is hoped that this thesis will contribute to an efficient transfer of Program Management Responsibility for the F-16.

A STUDY OF THE PROGRAM MANAGEMENT RESPONSIBILITY  
TRANSFER PROCESS FOR THE F-16

I. Introduction

Purpose

The purpose of this thesis is to examine the Program Management Responsibility Transfer (PMRT) process by surveying the official written guidance and interviewing some of the key personnel involved with recent major weapon system acquisitions. It is hoped that the problems and recommended solutions will be of benefit to the managers of the F-16 PMRT planning process.

Objectives

The primary objective of this thesis is to enable the F-16 PMRT process to avoid some of the problems which have plagued previous aircraft systems. The research methodology employed requires that several secondary but prerequisite objectives be met.

The first of these objectives is to establish a set of criteria by which PMRT events can be evaluated. Next, these criteria must be applied to previous weapons systems so that potential problem areas can be identified. The final objective is to recommend solutions to these

potential problems so that the F-16 PMRT can avoid them or at least minimize their effects. These objectives and the associated research methodology will be covered in detail in Chapter Two.

#### A Caution

Throughout this paper the two terms PMRT and transition will be used to denote the transfer of various responsibilities from AFSC to AFLC. The writer has made every effort to use the word transition only when discussing this transfer on weapon systems which preceded the F-16. When discussing this transfer without regard to a specific system, the writer will denote it by the single word "transfer" or the combination "PMRT/transition."

#### Background Information

The term "Program Management Responsibility Transfer" (PMRT) is new, but the practice of transferring management responsibility for a weapons system from the acquiring command to the supporting command is not. Since 1951 when the Air Research and Development Command (ARDC) was created, there have been two separate commands responsible for a given weapons system at various stages of its life cycle.

From 1951 to 1961, ARDC was responsible for research, development and in service engineering and Air Materiel Command (AMC) was responsible for procurement, supply and

maintenance. When Air Force Systems Command and Air Force Logistics Command (AFSC and AFLC) were created in 1961 from ARDC and AMC respectively, AFSC picked up the procurement and production function for new systems and AFLC assumed the in-service engineering function. This realignment of functions necessitated a formal transfer of responsibility from AFSC to AFLC. It is this transfer of the management responsibility which is now referred to as PMRT.

Prior to the publication of the 10 March 1975 version of AFR 800-4, PMRT went by the general name of "transition." Such a simple name proved to be too nebulous, however, and there was some confusion as to exactly what the term meant. As the Air Force Inspector General (AF IG) reported in May, 1974, transition was used to denote any or all of the responsibilities now encompassed by PMRT: funding and budgeting responsibility, overall management responsibility, and Air Force Engineering Responsibility (AFER). AFR 800-4 now requires that all of these responsibilities transfer from the acquiring command, normally AFSC, to the supporting command, normally AFLC, en masse on the PMRT Date (PMRTD).

One reason why there was confusion as to the meaning of transition in the pre-PMRT era is that the three responsibilities transferred separately. A brief description of the transition process will serve as a basis for discussing several of the problem areas in Chapter Three.



The reader must remember that while it is convenient and even substantially accurate to bundle up the three areas of responsibility and call the aggregate "PMR," there are some responsibilities which do not transfer from AFSC to AFLC. For example, the procurement of whole systems is an AFSC function and does not transfer to AFLC.

There are other functions which do not actually transfer but which are managed differently after the PMRTD. A good example is depot level maintenance which is performed by AFLC at the Air Logistics Centers (ALC). So long as the SPO is funding for the Modifications (undating changes) which are installed at the depot, AFSC has an important voice in the scheduling of those modifications. Subsequent to PMRT, however, AFLC assumes the total responsibility for managing as well as performing the depot maintenance.

Finally, there are some functions which transfer totally as of the PMRTD. The best example of this, because it involves all three of the aspects of PMR, is the responsibility for modifying delivered aircraft. Except for Class V Modifications which are directed by HQ USAF to either command, AFSC is responsible for all updating changes prior to PMRT and AFLC is responsible for modifications after PMRT. The responsibility is total and includes budgeting, funding, engineering and overall management for the changes.

The piecemeal approach to transition usually began with the transfer of responsibility for funding and budgeting of modifications to delivered aircraft. (When AFLC makes a retrofit change, it is called a modification. If AFSC is responsible, it is termed an updating change.) A list of all updating changes which were to be funded by AFSC was mutually agreed to as of a specific date, the Retrofit Management Breakpoint (RMB). All problems and deficiencies discovered after that date were AFLC's responsibility to fund. The RMB became a significant date and a necessary one. In order for the two commands to properly budget for updates/modifications, it was essential that all requirements be known ahead of time so that the fiscal budget cycle could incorporate those requirements.

The real reason that the Breakpoint became a necessity was the manner in which the Congress appropriated the money for changes (P-1100 funds). In the beginning, P-1100 funds were utilized solely by AFLC for Class IV and Class V Modifications, but eventually AFSC was directed to use P-1100 money for updating changes also. The ins and outs of budgeting P-1100 money will be discussed in detail in Chapter Three, but the important point here is that the Air Force needed to know which command needed how much money for each weapons system each year. Hence, the RMB was instigated.

The second responsibility, chronologically, in the same transition process was for overall management of the system. This is the responsibility most often associated with the term transition. AFSCR/AFLCR 800-7 required that the date for transition be established at least one year in advance. In actual practice, even though an approximate date was informally agreed to, everything in the transition agreement was subject to negotiation including the effective date. In fact, the Update Change Agreement and the Retrofit Management Breakpoint were also subject to renegotiation prior to the signing of the transition agreement. This provided a lot of flexibility but little basis for accurate planning.

The final and most important aspect of transition was the transfer of AFER. As will be substantiated in later chapters, the agency with AFER is perceived by most people within the system to be the true manager of the system.

AFER is carefully defined in AFSC/AFLC Regulation 80-17 which was first written in 1959. AFER is defined as "Accountability for the integrity of design and performance of Air Force systems and equipment." (6:1) It includes system engineering, acquisition engineering and operational engineering.

AFER transfer was nearly always the stumbling block which prevented a smooth transition. There were always

exceptions to engineering transfer, listed in the Engineering Transfer Package (ETP), which remained the responsibility of AFSC and prevented the System Program Office (SPO) from reducing their personnel requirements.

Engineering transfer can only trace its history back to 1961. Prior to the creation of AFLC, AMC did not have an organic engineering capability. ARDC retained AFER from cradle to grave although they did collocate engineers at the Air Materiel Areas (AMA) to perform the in-service engineering function. When AFSC and AFLC evolved in 1961, AFLC was authorized a Service Engineering Division (SED) at each AMA. At the same time, AFER for all operational systems was transferred to AFLC.

There is another aspect of transition or PMRT which doesn't fall neatly in any of the three categories discussed above. The important point about configuration control is that it can be exercised simultaneously by the two commands if funding and budgeting of modifications is not concurrent with AFER. When this happens, each command's Configuration Control Board (CCB) must approve the change and conversely either command can effectively prevent the incorporation of a change (3:12).

One of the key elements in the recent history of PMRT is the AF IG report concerning transition. AFP 800-4 (10 March 1975 version) is a direct result of that report. The relationship of the IG Report to the objectives of

this thesis will be discussed in the final section of this chapter.

#### Scope and Limitations

The conclusions and recommendations of this thesis are solely for the F-16 and its PMRT process. This is not intended to be a general purpose solution to the PMRT problem. Neither is this intended to be a discussion of the system acquisition cycle nor a reiteration of all the problems at the AFLC/AFSC interface. Much of the research for this thesis might be of use to other weapons systems provided those systems parallel the F-16 to a certain degree. By briefly describing the acquisition environment for the F-16, a set of criteria for applicability to other systems is more readily apparent. This description will aid the potential user in determining whether the results of this effort are applicable to another system.

The F-16 is a major weapons system requiring Defense Systems Acquisition Review Council (DSARC) approval prior to initiating a new phase (validation, full scale development, production). The F-16 makes maximum use of existing technology to reduce the technical risk, the only major subsystem development being the attack radar. From the beginning the development has been highly sequential or nonconcurrent. There was a prototype fly-off in the validation phase and there is an extensive full scale

development phase prior to production go ahead. Finally, the proposed manufacture of parts by the Consortium makes this program unlike any other.

In addition to the acquisition environment, the F-16 has a peculiar PMRT and follow-on support environment. Some important changes have occurred in the area of PMRT and within the basic AFLC structure. These distinctions will only be listed now; their ramifications will be examined in later chapters.

First, the new AFR 800-4 and its joint supplement are the primary guidance for PMRT and other regulations will be modified accordingly. The new DCS/Acquisition Logistics at AFLC Headquarters is providing direction to the Deputy Program Managers for Logistics (DPML) in the SPOs. The DPML is the System Manager now, providing additional continuity between the two commands. AFLC has proposed a reorganization at the Air Logistics Centers (ALC) which will affect the System Manager/Item Manager (SM/IM) relationship. The F-16 SPO is employing Life Cycle Costing to a degree never before attempted on a major weapons system. The SPO is also studying the use of Reliability Improvement Warranties (RIW) as a means of obtaining a better quality product. Finally, the Consortium and projected Foreign Military Sales (FMS) require solutions to problems which up to now have eluded solution. The combination of these factors provides the F-16 with a unique

environment that must be carefully considered before using the results of this thesis.

### Research Methodology

The problem of transferring PMR for a major weapons system from the acquiring command to the supporting command is not a universal problem. Even within the Department of Defense, the Air Force is the only service which manages its systems in such a manner. Consequently there is virtually no literature available except for official Air Force directives or Air Force sponsored reports and papers. A Defense Documentation Center (DDC) search was initiated with negative results.

The available data concerning the rather narrow topic of PMRT for major aircraft weapon systems falls into four general categories. First, there are the official Air Force directives such as the "800" series regulations on Acquisition Management. Next, there are official Air Force studies, reports (IG) and previous transition plans and agreements. Third, there is personal opinion which was gathered by interviewing selected personnel associated with past and current PMRT efforts. The final source of information is the academic community. There were no AFIT School of Engineering theses which addressed the subject area. Of the five AFIT School of Systems and Logistics theses in the general subject area, only one was eventually

used. There was one paper from the Air University which was useful for background materials.

With regard to the current PMRT environment, the applicable regulations play an important though not completely defined (as of this writing) role. The new AFR 800-4 is the first to define PMRT and establish the requirement to transfer all responsibilities simultaneously. It was dated 10 March 1975 and is quickly gaining exposure at all working levels. But the remainder of the "800" series have not yet been revised to reflect the PMRT concept. The joint AFSC/AFLC Supplement to AFR 800-4 is completed and scheduled for publication in late summer of 1975. It is the key implementing directive for the workers and its significance will be discussed in Chapter Four. It is not yet known if the AFLCR/AFSCR 80-17 will be rewritten (on transfer of AFER).

One obvious source of information, both for historical and timely reasons, was the AF IG Report "Functional Evaluation of the System/Equipment Transition Process." This report examined several systems including some of the major aircraft systems such as the C-5, F-111 and F-15. This data was valuable to the writer, but it was not used to the exclusion of other relevant data. The IG team interviewed hundreds of Air Force personnel from several commands, military and in service civilians, in order to provide a sound basis for their findings. The



writer did not attempt to duplicate this effort, nor did he accept all of the IG team's findings (especially their conclusions and recommendations) as gospel.

As Chapters Two and Three will depict, the problem of transferring PMR involves both people and money. The money problem is basically one of scarcity and is not closely related to the research methodology employed here. But the people problem is, and for two reasons. First, the lack of published information forces one to use personal opinion as a primary source. Second, and more direct, the people who are the most knowledgeable and therefore most likely to be interviewed are also the same individuals, by and large, responsible for the problem. If the problem is viewed as an adversary "battle" between AFLC and AFSC, this situation could easily bias the data at the interviewer's discretion. However, when viewed in the light of finding solutions which benefit the Air Force this situation is not only adequate but desirable.

As stated above, the people selected to be interviewed were all involved with the transition process. Nearly all of them were assigned to Wright-Patterson AFB, either at HQ AFLC, HQ ASD or in one of the SPOs. Compiling a list of personnel to be interviewed was one of the first steps in the research process, but additions were made based on the recommendations of some of the earlier people interviewed. A complete list of all the personnel

interviewed is to be found in the Appendix, including a brief description of his association with the transition process.

The observant reader will note that while the people interviewed are about evenly divided between AFLC and AFSC, many of the AFLC subjects are from the HQ but none of the AFSC subjects is from the HQ. The explanation has nothing to do with the physical location of the two HQ. It is because in AFSC the HQ (AFSC/SDDS) is involved only to the extent of formulating policies and guidelines. In AFLC the HQ has traditionally been intimately involved in the transition planning and in fact the AFLC/MM is the approving authority for major transition agreements. This difference in approach will be examined extensively in subsequent chapters.

The interviews were basically unstructured. All were conducted by the writer and all but two telephone interviews were in person. Each interview began with a brief resume of the writer's credentials, followed by an explanation of the purpose of the thesis and the role of the interviews as source material. The interviewer asked only general questions, e.g., "What is your opinion of past transition events?" In most cases the person being interviewed ventured forth his ideas with no prompting from the interviewer. Although the general areas the interviewer wished to cover were outlined prior to conducting the first

interview, the interviewer discovered that his interviewing ability improved. The writer believes that this effect did not affect the quality of the material obtained in the initial interviews, but could have reduced the amount of time needed to conduct the initial interviews.

The writer considered using a survey questionnaire, but rejected the idea for two reasons. First, it was difficult to define a proper population to be surveyed. The extreme would be to survey everyone in every major SPO and SM division, all the important IMs at the ALCs, and all the key individuals in HQ AFLC and HQ AFSC. Second, if a population could be selected, the results of a survey would most likely involve a quantification of the results which was not the process the writer intended.

An advantage of the interview was that it allowed the interviewer to discern personal opinions as well as the "party line." Most of those interviewed were extremely candid in their replies, and only a few did not authorize the interviewer to quote them directly.

The major advantage of the interview as a data gathering technique is that the subject of PMRT is a highly emotional one and everyone involved has very clear and sincere perceptions of right and wrong. The writer first discovered this emotionalism while working in the F-111 SPO. There were some highly polarized and divergent attitudes about how to effect transition. The only prejudice

the writer retained into this research effort was a firm belief that the transition problem is solvable, not by arbitrary dictate but through mature mutual understanding of the basic problems and issues. There is no intent in this thesis to point accusing fingers at the two commands or the Air Staff or higher. The purpose is to bring the real problems out in the open and then deal with them in a manner which best benefits the F-16, the Air Force and the American taxpayer.

## II. Criteria for Evaluating Transition/PMRT

This thesis has as its underlying assumption that the USAF has not enjoyed an enviable record of transferring program management responsibility from the acquiring command to the supporting command. Furthermore there is a presumption that the PMRT process for the F-16 can be more "successful" if the problems of past transfers can be examined and compared against a set of criteria which represent attributes of a "good" PMRT process. The purpose of this chapter is to establish those criteria. The first step in doing so is to study the history of PMRT, or transition as it was called prior to March, 1975.

In the beginning, which for the modern Air Force was the World War II era, there was no transition. The Air Corps was part of the Army then and the Army had (and still has) a single command, the Army Materiel Command, which managed a weapon system from conception to the boneyard. When the Air Force gained independence in 1947 it retained the single command concept but changed the name to the Air Materiel Command (AMC). Even after the ARDC was created in 1951 there was no pressing need for elaborate transition procedures. What transferring that did occur was taken care of by the personnel in the joint project office. In 1954 the first WSPO (Weapons System

Program Office) was formed. AFR 20-10 specified that control of the WSP0 would transfer from ARDC to AMC at the time of production decision since AMC still did the procurement (31:6-10).

The creation of AFLC and AFSC in 1961 signaled the start of the modern era for transition. As the name implies, transition was envisioned as a smooth, planned process. The "375" series of regulations came about partly because of the new alignment of responsibilities between AFLC and AFSC and partly in response to the problems encountered on the F-106. Although the F-106 was transferred to AFLC despite problems with the J-75 engine and the air weapons control system, HQ was determined to avoid delays in transitioning because of inadequate preparation (21:1). Hence AFR 375-3 and AFR 375-4 for AFLC and AFSC respectively were written. The "375" series governed transition activities until they were replaced by the "800" series in the early 1970s. In 1975 the concept of PMRT was conceived to make the transfer process more efficient and less drawn out with respect to engineering transfer. AFR 800-4 and the joint AFSC/AFLC Supplement are the first regulations to prescribe procedures for the PMRT process.

The most difficult objective of this research effort was to establish the criteria which define a "good" transfer of management responsibility from AFSC to AFLC. The mere use of the word "good" implies a less than totally

objective treatment, and as the remainder of this chapter will confirm, the actual criteria are somewhat subjective. The dearth of suitable reference material (see the Research Methodology section of Chapter One) in the general subject area is mild compared with the availability of useful written criteria.

After considerable mental anguish, the writer concluded that there are three different categories of meaningful criteria concerning transition/transfer. The first category consists of official Air Force directives that prescribe when any major system should transfer. They are intended to be used by the program managers (SPD and SM) as a planning tool in selecting a suitable date for transfer. During the course of the research effort the writer discovered that in most instances these criteria were adhered to yet there were still problems encountered. The writer then concluded that these criteria were ineffectual as planning tools and hence not sufficient as criteria for measuring a "good" transition.

In order to supplement the official guidance, the writer utilized data from the interviews to assemble some subjective judgments as to when it should occur and what the relevant issues should be. This second set of criteria not only addresses the question of when, but also the question of why. It supplements the first category. The

people interviewed were selected by the writer based on their current or past direct association with transition.

The third and final category consists of criteria which consider not only the actual transition process but also the basic management environment in AFSC, AFLC and to a lesser extent in HQ USAF. The writer chose a simple management philosophy which incorporates the modified process approach. The writer believes these management criteria are valid because the issue under investigation is the transfer of program management responsibility.

#### Official Guidance

The official guidance specifies the status of a system as the prerequisite for transition. AFSCR/AFLCR 800-7, "Transition Planning and Agreements," which was the primary regulation governing transition of PMR prior to the publication of AFR 800-4 in March, 1975, attempted to establish criteria for all systems and nonsystems equipment. Transition of program management responsibility for systems normally occurs at completion of the production phase of acquisition when applicable criteria below have been met.

(1) The product baseline has been firmly established.

(2) Qualification to the specifications or equivalent has been accomplished in accordance with AFSCR/AFLCR 80-16.

(3) Specified design and performance requirements have been successfully demonstrated by the development test and evaluation program (AFR 80-14).



(4) All required updating changes have been identified, approved and placed on procurement (AFSCR/AFLCR 57-4).

(5) Mutual agreement has been reached that adequate engineering and technical order data are available at the requiring activity for operation, configuration control and accounting, maintenance, and other necessary logistics support requirements.

(6) If reprourement of qualified like items is a requirement, data for reprourement support, procurement data package support, and AFSC/AFLC coordinated DD Form 1418, Procurement Data Record, are available in accordance with AFR 57-6/AFSC/AFLC Sup 1 and AFR 310-3/AFSC/AFLC Sup 1. (7:1)

Although AFSCR/AFLCR 800-7 does contain the most detailed criteria for determining when to transition, there are other regulations which state similar but not always identical criteria. The reader is referred to Finding #2 of the IG report for the exact wording differences among the several regulations. The report summarized the situation by stating that "Conflicting guidance in the large number of regulations and manuals affecting transition confused and hindered the transition process." (16:8)

Just as AFSCR/AFLCR 800-7 provided the most comprehensive criteria for transition of management responsibility, AFSCR/AFLCR 80-17 is the primary source of criteria for transferring AFER. This regulation also considers end of production to be the best time for transfer. "Air Force engineering responsibility for the system will be programmed to transfer from AFSC to AFLC at the completion of system acquisition by series." (6:2)

With respect to transition planning, AFSCR/AFLCR 800-7 was more flexible. The regulation stated that the

SPD and the SM would jointly establish an initial target date for transition. This date would be published in the Program Management Plan (by HQ USAF) but would be "progressively revised as dictated by program changes."

(7:2) It further required that the final agreement be formalized and submitted to HQ USAF for approval at least one year prior to the target date.

#### Subjective Criteria

The lack of flexibility in the official directives was one of the reasons they were somewhat ineffectual in guaranteeing a "good" transition event. AFSCR/AFLCR 800-7 used as its primary criterion the end of production for determining when to transition. Nearly all of those interviewed agreed that transition should occur earlier in the production phase, but only if the reliability of the system had stabilized. The difficulty in applying such a criterion is that transition planning must occur during the full scale development phase and it is nearly impossible to predict exactly when the desired amount of design stability will be reached for a given system. Several of the people interviewed, however, have independently arrived at the same observation regarding past systems. Mr. T. J. Keating, Chief Engineer for the F-15 SPO and former Chief Engineer in the F-111 SPO, believes that the majority of the deficiencies that will be found in a system are found during the first twelve to eighteen months of operational use.

Mr. John Hyson of the ASD staff said that the number of problems reported dropped off significantly after the first eighteen to twenty-four months of operational use. Some of these deficiencies are uncovered during flight test and some are reported by the operating units.

Based on these observations, the writer concluded that the system would be close to its ultimate reliability after about twenty-four months of operational use. This conclusion does not assume that the ultimate reliability is the same as the design specified in the contract. As a planning criterion, though, it allows a date for transition to be chosen early with some expectation that the reliability will be stabilized.

Most of the recommendations received in the interviews emphasized the need for thorough planning far in advance of the actual transition date. One of the actions that was deemed to be necessary was to build a strong support organization within AFLC. This includes the SM division primarily, but also the IM and Engineering divisions at the ALCs. It is also related to the planning for a specific date for transition. As Major F. D. Ruth, currently the C-5A DPML and formerly assigned to the F-111 SM division as an engineer, recalled, some of the F-111 engineers from the SED were sent to General Dynamics for training on specific aspects of the F-111 in anticipation of engineering transfer occurring at the end of production

of the F-111As and Es. By the time transfer did occur in 1973, many of those engineers had been assigned to other programs. Even in 1973 only a portion of the As and Es transferred. It is essential to select a firm date far enough in advance to allow the support organization to come up to speed.

Another action which must be planned for is the establishment of clear procedures for coordination between the two commands. When transition occurs near the end of production, AFLC is assuming responsibility for aircraft which are nearly all operational. Any modifications will probably be incorporated at the depot or in the field because it is too late for a production break-in. But if AFLC takes over when only part of the fleet has been delivered, there must be close coordination with AFSC before AFLC takes an action which affects the whole fleet. An example is if AFLC grounds the fleet for one reason or another, all aircraft are affected, even the ones which have not yet been accepted by the Air Force. According to Lieutenant Colonel Robert Kellogg, former Chief of the Configuration Management Division in the F-111 SPO, AFSC would not even be allowed to fly the acceptance flights on newly delivered aircraft if AFLC grounded the fleet. Closer coordination would have even greater monetary effects in the case of a modification involving a possible production break-in or retrofit. It is much cheaper to

incorporate changes by a production line break-in than via a retrofit, either before delivery or in the field. Another area that must be planned for is the modification of Aerospace Ground Equipment (AGE) in conjunction with a system modification. Since AFSC funds for changes to peculiar AGE on an updating change and AFLC funds for common AGE, and some aircraft will be modified on the production line and some in the field, it would be possible for some of the aircraft to be nonsupportable when they came off the production line.

The gist of these examples is that planning for contingencies must occur prior to transition. The disruptions caused by the change in management and the accompanying change in methods of doing business must be anticipated.

A fourth criterion for a "good" transition is that it encourages efficient utilization of assigned personnel and resources. The IG found that delaying transition and stretching engineering transfer tended to result in a duplication of effort in the SPO and the SM and engineering divisions. Colonel David Stephenson in a paper which studied the transition process, compared the F-111 and F-15 and concluded that the F-15 was headed in the same direction as the F-111, namely toward an ". . . inefficient, unwieldy, redundant, and protracted AFLC/AFSC interface. . . ." (36:20) Not everyone shares this view. Colonel

E. C. Hamilton, Jr., F-111 SPD, thought the IG report overstated the case for possible savings from an earlier transition/transfer in terms of SPO manpower productions, but he did concede that some savings were realizable in the engineering and configuration management functions.

One of the difficulties with tying manpower reductions to transition events is that systems are transitioned by MDS. Since SPO personnel work on all the series, e.g., F-4C, F-4D, F-4E, etc., there is no correlation between SPO manpower and transition of the F-4C. A more meaningful criterion might be a subjective measure of the nature of the decisions being made by the respective managers. As aircraft are deployed and day-to-day operations prove that the system really works, the operational decisions made by AFLC in close coordination with the using command tend to drive the system. Although this point in time is difficult to predict for a specific system, past experience may provide a reasonable guideline. One DPML asserted that the using command preferred an earlier transition because it simplified the coordination process. The criterion then is that the SM should assume the official management responsibility at the time he is in fact truly managing the system.

There were several reasons given to support the wisdom of an early (before the end of production) transition, and one reason why not to. The reasons favoring

early transition are listed below.

(1) If there is a learning curve associated with management as there is with production, then AFLC should make their mistakes before the majority of the aircraft are deployed.

(2) Since AFLC must live with decisions forever, they should be allowed to make as many of those decisions as possible. Likewise they should have to justify the dollars for ECPs.

(3) If transition occurs near the end of production, the SPO has already begun to phase down. Early transition means more SPO expertise is still available for consultation.

Mr. Vaughn Anderson, AFLC/MME Deputy, believes that transition should not occur prior to the end of production in order to allow time for AFSC to exercise their procurement data themselves before turning it over to AFLC. The thrust of these reasons can be combined in a single statement: transition should occur at the time the SM is truly managing the system provided the elements of responsibility have reached an acceptable level of maturity.

These first two categories of criteria have looked at the situation only with respect to the actual transition event. The third and final set of criteria are concerned with the management environment in which transition occurs. The general management principles will be briefly discussed

and then they will be fitted to the management structure of the two commands and HQ USAF.

Criteria Based on the Principles  
of Management

From a management theory point of view, some subjective criteria concerning the PMRT process can be established. There are several different schools of management theory and even more popular methods of managing being espoused today. The writer has selected the modified process approach as the framework within which to evaluate the PMRT process. In addition to the PMRT process the management structure of AFLC and AFSC will also be examined vis a vis the modified process approach.

Management consists of numerous actions. To facilitate discussing these actions most of the authors group the actions together by functional areas. The modified process approach divides management activities into four areas: planning, organizing, actuating and controlling. Some experts in the field place great importance in the names for the functional areas and in placing the activities in the correct area. For the purposes of this thesis the four functional areas merely provide a convenient means of keeping track of the activities which are important in the PMRT process.

Management involves all four of the functions of planning, organizing, actuating and controlling, and good



management means doing each of them at the right time (not necessarily sequentially) and in the proper amount. The remainder of this chapter deals with each of these functional areas with emphasis on some of the principles of management that are (in the writer's opinion) important to the PMRT process. Although each area has application to PMRT, the functions of planning and organizing will receive more attention.

### Planning

The first step towards successful management is to formulate plans. As Professor George R. Terry states,

Planning is the selecting and relating of facts and the making and using of assumptions regarding the future in the visualization and formulation of proposed activities believed necessary to achieve desired results. (37:192)

Generally speaking the four functions of management overlap one another, but some planning must precede the other functions because organizing, actuating and controlling are all performed in response to planned goals or objectives.

Planning must occur at all levels in the chain of command affecting PMRT. Congress plans through its formulation of the budget, DOD plans for all three services and so on down to the SPD and SM who plan for PMRT for a specific program. The most basic criterion in evaluating some aspect of the PMRT process, then, is to discern whether any planning occurred. As the initial function in the management process, planning, or its absence has a

tremendous influence on the ultimate success of a transfer. This same basic criterion can be applied to the many categories of plans which include objectives, policies, procedures, methods, standards, budgets and programs. Through the use of hindsight the importance of each of these forms of planning can be evaluated for a specific instance. Not every form of plan is required at every level.

### Organizing

The second step in the modified process approach to management is organizing. According to Terry,

Organizing is the establishment of effective behavioral relationships among persons so that they may work together efficiently and gain personal satisfaction in doing selected tasks under given environmental conditions for the purpose of achieving some goal or objective. (37:298)

This definition emphasizes the human relations aspect of organizing, but is valid for this thesis because people are the prime contributors to problems in the PMRT process (as will be shown in the next chapter). As the definition points out, planning precedes organizing and the two are closely interrelated. They are similar also because organizing, like planning, occurs at every level of management from Congress on down to the SPO and SM division. Unlike planning, though, the biggest problem with organizing lies not with its omission but rather with a failure to follow some or any of the generally agreed to concepts or principles of good organizing.

The remainder of this section will consist of listing and briefly describing those concepts or principles which are applicable to the PM/T process, from Congress through DOD and eventually the working levels. These concepts have been collected under the organizing function but some clearly are involved to some degree with planning and others with actuating or controlling or all three.

(1) Authority and Responsibility. "Authority is the official and legal right to command action by others and to enforce compliance." (37:328) Responsibility, on the other hand, is "The obligation of an individual to carry out assigned activities to the best of his ability." (37:334). Authority and responsibility are two separate but related things. The modern concept is that a manager must have sufficient authority to carry out his responsibilities, and likewise he must be held responsible for his authorized actions.

(2) Delegation of Authority. Closely related to the concept of authority versus responsibility is the idea of delegating authority. Generally speaking, managers are responsible for a great deal more than they have the time to do themselves. Hence, some delegation is mandatory if the work is to be done at all. There are many aspects of delegation, but the concept that is important is directly related to authority versus responsibility. A manager must be delegated sufficient authority to carry out his

assigned duties (responsibilities) effectively and efficiently.

(3) Centralization versus Decentralization of Authority. This issue is related to both of the above concepts. It deals with the degree to which authority is concentrated. There is no good or bad amount of centralization that every organizational structure must strive for. Depending on the environment in which an organization operates, there is probably an amount of centralization which is best for that particular organization at that time. Again, hindsight will make it must easier to determine that correct amount.

(4) Span of Authority and Unity of Command. Span of authority deals with how many workers report to a single supervisor. Different authors have different opinions of what the optimum number is, and no attempt will be made here to settle on a specific number. The generally accepted principle is that too many immediate subordinates reduce the manager's effectiveness. Unity of command is the other side of the coin. Whenever possible, a person should have only one immediate supervisor.

(5) Departmentation. Departmentation occurs because there is more than one manager at a given level in the organization. There are many theoretical methods of dividing up the work among several managers, but only a few are practiced by the organizations which make up the

PMRT chain of command. These include (by) function, product, process, program, matrix or customer. There is no principle that says one method is always better than another. The key is that the type of departmentation must be compatible with the organization's objectives and the breakout of authority relationships.

(6) Line and Staff and Functional Authority. An organizational chart normally denotes the line and staff relationships. In the military the line is the chain of command and staff is usually labeled as such, e.g., Deputy Chief of Staff for Personnel, etc. Line authority involves making a direct contribution to the accomplishment of the major objectives of the organization. The staff is there to assist by providing expertise in specific areas such as finance, personnel, etc. When a staff member exerts authority over a line element it is called functional authority. Functional authority per se is not bad, in fact few organizations could survive without some amount of it. The general principle is that functional authority should be limited and should not violate the principle of unity of command.

The organizing function is crucial to a successful transition because it establishes the people relationships. Several of the concepts of organizing have to do with authority and responsibility. In the transition process, the negotiators must have sufficient authority (and

responsibility) to commit their respective commands to a final agreement. To do so requires that the commanders of AFLC and AFSC and those in the direct chain of command delegate sufficient authority to the SPD and SM. It is also important for only one person to have the delegated authority from each commander.

Regarding span of authority and unity of command, a manager must not have more people reporting directly to him than he can effectively control. Likewise, the SPD and SM should only report to one boss each. Finally, functional authority should be tightly controlled by the chain of command. Staff organizations should not make operational decisions as a general rule but rather should advise line elements in areas of their special expertise.

#### Actuating (Directing)

Actuating or directing as it is sometimes called is the third step in the modified process approach. Actuating can be defined as "Getting all the members of the group to want to achieve and strive to achieve mutual objectives because they want to achieve them." (37:435) This definition tends to accentuate the human relations aspect of management. Another older definition, of directing, which some may perceive as being more applicable to the military is "the executive function of guiding and overseeing subordinates." (25:387)

Actuating is the process which comes to mind most often as the guts of management. It has many other names including directing, leading, activating, guiding, inspiring, motivating among others. All of them focus on the one-to-one relationship between the supervisor and the worker. Many authors include communicating among the important elements of the actuating function. The large number of organizations that must interface during the transition process are absolutely dependent on effective communicating.

### Controlling

The final aspect of the modified process approach is controlling. Terry says,

Controlling is determining what is being accomplished, that is, evaluating the performance and, if necessary, applying corrective measures so that the performance takes place according to plans.  
(37:535)

In a management system, controlling closes the loop by providing feedback to the manager. It must be performed in conjunction with the other three functions of management.

The control function is made up of three general activities. First, the performance must be measured. Next, this performance must be compared with some sort of standard and any differences must be noted. Finally, if there were problems then some action must be taken to correct them. With respect to PMRT, each of these activities must take place.

### III. Analysis of Transition Problems

As Chapters One and Two have more than intimated, PMRT is not a simple task. Weapon systems have evolved and become increasingly more complex and expensive, and the problems of managing these systems have likewise grown enormously. At no other point in the life of a system are the problems more crucial or more visible than at the time of PMRT.

The purpose of this chapter is to identify and analyze the errors made and problems encountered on past aircraft systems similar to the F-16. There is no intent to indict individuals or organizations for their mistakes. As George Santayana put it, "Those who cannot remember the past are condemned to repeat it." (18:172)

After collecting the data and sorting out the problems into problem areas, the author observed that all the problems could be discussed in terms of two primary causes: people and money. This choice, which is somewhat arbitrary, does succeed in focusing attention on two areas that are both visible and capable of being dealt with.

People of course are basic to the issue because they not only make the decisions and write the governing directives, they also ultimately do all the work. It could be easily argued that people are the only reason



there are problems. J. Watson Wilson once observed: "If you dig very deeply into any problem, you will get to 'people.'" (13:3).

Money, or more accurately the lack of money, is a logical second basic source of PMRT problems. Certainly in a capitalistic society money has tremendous influence. And, as the competition among the federal agencies for tax dollars increases and the costs of acquiring and maintaining weapon systems skyrocket, money figures more prominently than ever in the decision making process.

The remainder of this chapter is devoted to a discussion of the problems of past PMRT events. These problems were compiled via the research methodology described in Chapter One. They have been grouped into five problem areas and each problem area has been given a (hopefully) descriptive title. The titles are for ease in referencing and may or may not adequately describe all the problems in a given problem area. Finally, the problem areas are not ordered in any special fashion.

#### Transfer of Engineering Responsibility

The single-most important aspect of PMR is AFER. Every person interviewed agreed that the agency with AFER really controls the system regardless of whether or not transfer of the other management responsibilities has taken place. As the major part of PMRT, engineering transfer is

the area in which problems can quickly bring negotiations to a halt. Likewise, the subject of AFER evoked the most emotion among those interviewed.

The writer discovered that engineering per se is highly regarded in the weapons system management community, especially in AFSC. The history of ASD is basically one of evolution in the field of aeronautical engineering for the Air Force. (For a complete tracking of this evolution the reader is referred to "Engineering History from McCook Field to the Aeronautical Systems Division, 1917-1973.") This book describes the many organizational changes, both in name and function, and the rapid turnover in recent years of the military chiefs of the ASD engineering directorate (ASD/EN) (31:1-50).

ASD/EN supplies virtually all of the in-house engineering manpower to the SPOs. EN personnel are assigned to SPOs as needed by specialty, yet retain their ties to the "home office" EN organization. Both military and civilians are assigned to EN, but because of their longevity (for continuity) the civilians control the organization. Many of the EN military personnel are junior officers with advanced degrees. The civilians for the most part are older, have several years as an AF engineer and have spent most of their civil service careers at ASD.

There is an abundance of personnel with engineering backgrounds in ASD, yet by and large they do not perform

engineering functions. Unlike the other services, the AF has never had a true arsenal system. Rather it has traditionally relied on its contractors, especially the prime contractors, to do the actual engineering for a new system. The role of the engineer in ASD has been to oversee these contractor engineers.

AFLC's engineers have only a slightly different role, despite the very different history of the engineer in AFLC. Prior to 1961, the ALCs did not have an in-house engineering capability. When AFLC was formed from AMC the ALCs were authorized to set up an SED at each ALC (21:1). While AFLC does some engineering, e.g., repair and maintenance of broken airplanes, they contract out most of the engineering associated with modifications just as the SPO does with development and update change engineering. As a general statement, then, neither ASD nor the ALCs do much pure engineering.

Although the engineers in each command perform primarily as managers, the writer observed that ASD personnel had a superiority complex about the quality of their "engineers" and their ability to manage a weapon system. This could be just a by-product of the esprit de corps which is common within the SPO type organization. In any event it is important to make a distinction here between individual feelings and group feelings. The advantage which SPO people believe they have is based not on

perceptions of individual ability, but on the strengths of the way the SPO does business. The systems approach to management as practiced in AFSC centralizes authority in the SPD and minimizes the red tape imposed by the intermediate levels of command between the SPD and the Chief of Staff. To operate under severe cost and schedule constraints, the SPO has a much more streamlined method of processing changes and putting them on contract than does AFLC. As Lieutenant Colonel Robert Kellogg, former chief of the F-111 Configuration Management Division pointed out, processing an ECP through the SPO instead of through an ALC can save 90 to 120 days. Being a member of a SPO carries more prestige than being a member of an ALC SM division or SED does. The real problem with this thinking occurs when it comes time to transfer a system. Although traditionally it is AFLC which is reluctant to accept responsibility, sometimes it is AFSC which feels it can do a better job of managing the system. If the system is ready to transfer otherwise, these feelings do not normally come into play. But when there is some question as to whether to transfer, AFSC can effectively "keep" the system by not actively pushing for transfer.

Another important aspect of the engineering problem and friction between the commands is the role of HQ USAF. When a decision is made to install a new capability on a weapon system (Class V Modification) HQ USAF decides which

command will manage the effort. If there is new equipment required in conjunction with the modification, this equipment will normally be developed by AFSC even though the modification might be managed by AFLC (3:11-12). In essence, then, HQ USAF can un-transfer part of the system back to AFSC. When these actions occur at or near PMRT time they create exceptions to transfer and complicate the management function by separating responsibilities.

Under the old system, before PMRT was coined, there were always exceptions to engineering transfer. Normally entire subsystems rather than a single line replaceable unit or structural part were made exceptions to transfer. The result of making exceptions was that the management became somewhat duplicated and confusion sometimes resulted when both commands had a hand in the management function.

The gut issue of the problem requires a knowledge of why exceptions were made. Often it was because there were still unresolved discrepancies with the equipment which AFSC had not yet fixed. At this level of discussion, the problem appears to be a money problem. In many instances, though, it would take massive amounts of money to fix the problem when a relaxing of the specification would have been more prudent. A good example is the Mark II avionics on the F-111D. Without rehashing the details of the development effort, when it came time to transfer the F-111D,

the first exception was the MK II package. And rightfully so according to the rules for transfer. The MK II was significantly below its design MTBF and the ECPs to bring it up to snuff were priced at several million dollars. Neither the SPO nor AFLC had the funds to buy the changes, so it didn't transfer. AFLC didn't want to accept a system which would cost them a tremendous amount of money to fix and maintain, yet it was just as easy (or impossible) for AFLC to ask for the funds as it was for the SPO. And whether the system transferred or not, AFLC still had to pay the depot repair costs since that was an AFLC responsibility anyway. The writer believes that the two commands should have accepted a lower MTBF by relaxing the specification and allowing the MK II to transfer, thereby avoiding the duplication of engineering and management functions. The issue was not whether to fix the deficiencies. Both commands agreed on the existence of the problems. The issue was whether it was necessary that AFSC fix them and thus hold up engineering transfer.

A similar situation exists for the C-5A. According to Major F. D. Ruth, C-5A DPML, the wing and fuselage still had not transferred. The apparent reasons are:

- (1) the fuselage is still only thirty-three percent complete with its Category I structural life test, and
- (2) the wing will probably be modified in 1980 to extend

its life to something approaching the original specification figure.

Sometimes, though, the decision to make a piece of equipment an exception to transfer has to do with the fact it is common and not peculiar equipment. Common refers to whether the equipment is used on more than one MDS. For example, the wing on the F-4C may be identical to the wing on the F-4D. The general policy has been to not transfer until the last MDS, which in the F-4 example means that the wing would be an exception to transfer of AFER in the F-4C ETP (6:3). According to Mr. Vaughn Anderson the F-111 was the first system in which the general policy was to transfer with the first MDS provided the piece of equipment was otherwise acceptable to AFLC.

The situation that developed was that the SM had all the responsibility except AFER. This in itself was recognized as a fact of life and presented no real difficulty so long as each organization knew which equipment they were responsible for. Sometimes there was confusion. Major Ruth pointed out that there is still some argument over which command has AFER for some of the C-5A equipment, and the C-5A ended production years ago.

The problems in the area of engineering transfer cover most of the criteria discussed in the previous chapter. In the case of the C-5A and F-111D, the criteria were strictly adhered to and transfer was delayed because of

items not being qualified or design specifications not being met or the updating changes not being placed on contract. Yet there was some doubt as to whether the items should have been transferred anyway in the interests of effectiveness and efficiency.

Several of the principles of management were offended. Lack of positive planning was evident. The failure to plan towards a specific transfer date meant that exceptions would crop up. AFLC had failed to institute procedures whereby the SM could approve ECPs and get them on contract without going through HQ AFLC CCB, thus slowing down the process, especially on jointly funded ECPs. The lack of effective communication resulting in a lack of understanding about how the "other" command operates and why was clearly a letdown in the actuating function.

#### Personnel Policies

A problem which is directly concerned with people but which is caused to a great extent by money is the matching of workloads to manning levels in both commands. The problem is most apparent at the working levels: in the SPOs, the SM divisions and the engineering organizations; but it is caused by the decision makers in their failure to stabilize workload and manpower.

The problem manifests itself differently in the two commands. In AFSC it is a problem of not bringing in new systems on a smooth, regular basis. The trend for the



past ten years has been to allow fewer and fewer systems to proceed beyond the conceptual and validation phases. One of the reasons for this trend is the currently popular philosophy of fly-before-buy and prototype competition. This will be discussed in more detail in the section on budgeting and funding. Also discussed in that section will be the lack of planning which dumps several new systems on ASD at the same time but then doesn't approve any at all for several years.

The lack of a steady influx of new programs gave the engineers a negative incentive to accomplish transfer of AFER. Since the EN directorate loans its people out to SPOs based on the needs of the SPOs, there developed a tendency for engineers to stay in a SPO until a job opened up in a new SPO. Although it was undoubtedly in the best interests of the AF to keep the engineers around perhaps longer than needed rather than fire them, engineering transfer didn't benefit.

Within AFLC the manning problem, especially for engineers, is of a different nature and in the long run more severe. According to Mr. Vaughn Anderson, Deputy Director of Engineering at HQ AFLC, the ALC SEDs have lost about 500 engineering slots over the last seven years. During this same time period, existing systems have had their service lives extended because the cost of modifying systems is often cheaper than procuring new ones. The

combination of these two trends has put considerable pressure on levels of management to effectively manage an increasing number of systems with a decreasing number of people. Although the official HQ AFLC policy has been to not use limited engineering resources as an excuse to not transfer AFER, the situation certainly does not lend itself to facilitating the transfer (8:1).

These are basically long range planning and organizing problems. In AFSC the problem is strictly one of looking at the short term to the exclusion of the long term. Undoubtedly this is complicated by the Congress' yearly budgeting cycle which can play havoc with AFSC's planning when Congress decides to slip a program or insert one of its own. In AFLC, though, the situation is more critical. While AFSC can recover by applying some long range planning that Congress will go along with to smooth their workload, AFLC needs more people because their workload is relatively fixed.

#### Organizational Differences Between AFSC and AFLC

One of the primary causes of problems in the PMRT process can be traced directly to the difference in the way the two commands do business. In a nutshell, AFLC is functionally oriented and AFSC is systems oriented. While that statement may overgeneralize, it is sufficiently accurate to serve as the starting point in a discussion of

the significant differences in the structures and day-to-day operations of the two commands.

The systems approach to management has enjoyed great success in the post-World War II era. The AF has chosen the systems management method to the exclusion of all others for guiding large scale weapon systems through the conceptual, validation, full scale development and production phases. The key to this approach has been the concentration of authority and responsibility in a single organization, the SPO, headed by a single manager, the SPD.

Similarly, the functional approach to management has been used successfully by all of the services even before systems management came into vogue. The AF employs functional management during the operational phase for all of its systems. Item managers at the ALCs are responsible for the thousands of different commodities needed to keep the complex systems in service.

Although both methods of doing business work, they don't necessarily work simultaneously and there is a discontinuity in the management of a system at the time of PMRT. The switch-over from systems management to functional management has sometimes been traumatic for the system. Historically, the PMRT process is a negotiation for the "right" to assume responsibility for a weapon system although it is not always easy to tell who's selling and who's buying.

When the commands meet to discuss a given PMRT agreement, AFSC is represented by someone from the SPO and AFLC by a member of the appropriate SM division. When the negotiators reach an agreement, they return to their respective organizations for staffing and coordination. In AFSC the SPD staffs it and then approves it. HQ AFSC gets an information copy.

It's not quite so simple in AFLC. After staffing in the SM division and approval by the SM it goes to the local SED for approval. If the agreement affects major subsystems which are managed by IMs at any of the ALCs it goes to them for approval also, as well as to their SEDs. When it has been reviewed thoroughly at the ALC level it goes to the HQ AFLC for staffing by the DMM who ultimately signs the agreement.

There are two sides to this problem. The AFLC problem is one of authority and responsibility being delegated unequally. The SM is responsible for AFLC's portion of the PMRT agreement but he isn't given the authority over the IM's or the SED's to perform his job adequately. To compound the problem, the organization is not really set up to respond to one system manager and several item managers trying to manage the same system. The only person who is in the chain of command for both the SM and IMs (when they are not at the same ALC) is the commander of

AFLC. The SM can also be thwarted by the several directorates of the DMM at HQ AFLC.

The AFSC side of the problem is less obvious. In fact, at first glance it would seem that the SPO is in the ideal situation. For one thing, HQ AFSC does not get involved in the PMRT negotiation at all. Their only role is before the fact in the form of furnishing general guidance via official regulations. The problem is that the SPO tends to treat a PMRT agreement as the only one of its kind. SPO people don't understand the role of HQ AFLC because they expect it to be passive like HQ AFSC. Since the one advantage of a large bureaucratic group like HQ AFLC is its store of experience in dealing with many such transfers, the SPO is unable to effectively utilize this resource.

As Lieutenant Colonel Charles Coogan observed, the biggest problem encountered at PMRT time is the inability or unwillingness of the two sides to understand each other, which is a breakdown in communications and a failure to properly direct or actuate. The situation is also directly related to the disregarding of several of the principles of good organizing. First, the SM has not been delegated sufficient authority, and the authority he does have is not commensurate with his responsibilities. Second, there is not enough centralization of authority in the SM.

Finally, several HQ AFLC staff agencies exercise functional authority over the SM.

Within AFSC the organizing function seems to perform satisfactorily at the SPO level, but the control function at the ASD and AFSC levels is lacking. Not one of those people interviewed suggested that HQ AFSC assume a more authoritative role, but the writer believes that there should be a means of measuring the performance of past transition events to preclude repeating bad management practices.

#### Budgeting and Funding

The budgeting and funding problem is not peculiar to the PMRT process. It exists at every level of government and cannot be understood nor solved at the SPD/SM level without some understanding of where the dollars come from and why they are distributed the way they are. The problem being addressed is not just the general scarcity of money. The solution to that problem is beyond the scope of this thesis. The issue here is how the dollars are appropriated by the Congress and allocated by the DOD to the AF and finally to the individual systems managed by AFSC and AFLC. The basic assumption throughout is that competition for dollars among the many federal departments and agencies will continue at a constant or increasing pace.

As with many of the problems discussed in this chapter, budgeting and funding problems tend to come to a

head at PMRT time. Part of the problem is simply because the fiscal process is a cyclical one. Programs are sold to the Congress primarily based on what they will cost this year. Similarly the Congress may reduce the appropriation for an on-going program without carefully considering what the long term effects on the program will be. Only very recently has Life Cycle Costing (LCC) gained prominence among the legislators or the highest levels in the DOD. Despite the DOD's Five year Defense Plan (FYDP) there is still a tendency to (and an incentive for) understating the total costs of a program (because of the tremendous competition). If costs are real, though, they will show up eventually; and eventually often turns out to be PMRT time when AFSC can't afford to fix a deficiency and AFLC didn't budget for it either.

One item which often becomes an issue at PMRT negotiations is data. Data is a general term used to denote several types of information generated by the contractor to describe the hardware and software he is building for the government. Data is used by AFSC for follow-on buys of like configuration and by AFLC for reprourement actions. Data is an important part of the configuration control function and includes all the specifications for the end items.

The problem which usually surfaces at PMRT negotiations is that AFLC wants more data or data in a different

format than AFSC has contracted for. Some background information will help illuminate the situation. AFSC is responsible for procuring all of the data required for a weapon system including engineering data and reprocurement data. Most of this data is agreed to (by AFLC and AFSC) early in the life of the system, i.e., during the full scale development phase so that it can be placed on the production contract.

Historically AFSC buys a lot of data (in terms of volume, not percentage) that is never used by anyone, so each new program is determined to trim their data requirements to the absolute minimum. From the time the data requirements are set to the time of PMRT negotiations, a lot can happen to change AFLC's requirements. There may have been an honest omission or just a changeover in personnel in a key job which results in a personal preference for a different type of data. If AFSC is now compelled to purchase additional data from the contractor they end up paying more than it would have cost to place it on the original contract. Since AFSC is paying for data, there is a tendency for AFLC to want "everything" without really scrubbing the requirements.

There exists a problem in the budgeting and funding of modifications/updating changes. The problem has its beginning at the congressional level in the appropriation process. Money for modification/updating changes is



P-1100 and is part of the aircraft procurement appropriation, 3010. P-1100 money is specified by program element such as the F-111 (all MDS but not the FB-111A which is a separate element). These P-1100 funds are used by AFSC to buy kits for updating changes and by AFLC for Class IV and Class V modifications.

Each command prepares a separate budget for P-1100 money based on their respective expected requirements. The Air Staff combines the requests into a single line item in their proposed budget to Congress. When and if the appropriation is approved the Air Staff allocates P-1100 money to the commands based on their requirements. If both commands estimated their requirements exactly and there were no new problems identified since their budget submittals and no overruns, then this section wouldn't exist. All of those things do happen for the worse, and soon into the fiscal year the competition for remaining P-1100 funds is fierce. Transition often brings the problems of a scarcity of P-1100 funds to a head.

The Retrofit Management Breakpoint gains much notoriety since problems discovered subsequent to it are AFLC's responsibility. Disputes arise over who must fund a problem, but the choice is really academic since the money comes out of the (F-111 in this example) same pot. The problem gains significance, however, when neither command budgeted for the problem in the first place (each

assuming the other was responsible) since to fund it now would impact one command's inability to fund its remaining problems.

Just as interesting are problems involving split funding. Split funding is necessary when the weapon system has more than one MDS and some but not all MDS have transitioned. For example, if a discrepancy is discovered that applies to both the F-111A and the F-111D, and it is discovered subsequent to the breakpoint for the F-111A but prior to the breakpoint for the F-111D (the breakpoints were in fact several months apart) then AFLC must fund for the F-111A and AFSC for the F-111D portion of the modification. Such split funding occurred frequently on the F-111 and was handled routinely unless one of the commands had expected the other to pay for the entire modification. In those instances, the modification was delayed considerably while the "erring" command caught up in the approval cycle. As with the previous example, such situations caused some impact on the already budgeted modifications.

A problem which is sometimes the result of a budgetary decision is the issue of concurrency. Concurrent development refers to the practice of overlapping the full scale development and production phases. This avoids production gap expenses and reduces the total amount of time from drawing board to operational status. The major disadvantage is that the deficiencies which are discovered

must be retrofitted to delivered aircraft more often since the testing phase is not nearly so far along as it would be under a nonconcurrent development program. It is a generally accepted fact that the cheapest method of incorporating a change is via a production line break-in instead of a retrofit to aircraft already in the field. Those people interviewed agreed that concurrent developments resulted in a faster acquisition cycle but the total cost was higher.

The concurrent development philosophy is out of favor with the Congress and much of the DOD now because of the cost overruns on the F-111 and C-5 programs, both of which were developed under concurrency. When the agreed to transition dates arrived, there were still some very expensive problems which had neither been fixed nor even funded for. These problems, which were fully expected to exist under concurrency, nevertheless delayed transition and engineering transfer. As an aside, the decision for concurrency on the F-111 was made by then Secretary of Defense McNamara who also selected General Dynamics as the prime contractor. The decision to cut two years from the full scale development phase of the C-5 effectively made that a concurrent development although it was not originally planned as such.

This section is not intended to be an indictment of the concurrency doctrine. It has been used effectively

in several instances and has suffered from misunderstanding of its ramifications rather than from any inherent fault. Commenting on the relative merits of the two approaches to development, Mr. Arthur Poykin of the ASD staff said: "We don't want to overproduce underdeveloped aircraft, but neither do we want to test into obsolescence a few high cost programs." (9:1)

The funding and budgeting problems are mostly the result of organizational and communications deficiencies. The existence of two separate organizations (SPO and SM Division) managing the same system inherently violates the principle of unity of command. With regard to data, authority and responsibility are mismatched. In effect, AFLC has the authority to demand more or better data, but AFSC has to justify the dollars. The problems resulting from concurrent development are caused by lack of communication with Congress. The large numbers of ECPs on the F-111 and C-5A should have been expected by Congress because the DOD should have informed them of that aspect of concurrent development.

#### Security Assistance Program

A problem which receives less publicity than any of the other mentioned so far but which is potentially the most difficult to solve involves the Security Assistance Program. This program covers two different methods of strengthening the Allied air forces: Grant Aid which is a

form of foreign aid, and Foreign Military Sales (FMS) which requires the countries to purchase aircraft. This thesis will address only the FMS portion of the Security Assistance Program.

The problems associated with FMS are more complex than other PMRT problems because they involve the "assistance" of the DOD, Congress and the State Department. The normally difficult relations between AFLC and AFSC are further strained by the intervention of these other agencies which usurp some of the SPD's authority yet still hold him responsible for the cost, schedule and performance of the system. A good example of this is the offset agreement for the F-16 which is described in Chapter Four.

The primary problem seems to stem from the ways in which AFSC and AFLC are allowed to deal with foreign customers. AFSC develops and procures weapon systems for many foreign nations under the auspices of the Security Assistance Program. Common examples from the recent past are the F-104, F-4, F-5, F-111 and C-130. Sometimes there are subsystems on these FMS aircraft which do not exist in the USAF inventory. Such equipment is called country peculiar equipment and therein lies the heart of the problem.

The problem is more simply stated than solved: AFSC is authorized to procure country peculiar equipment for AFLC is not authorized to support it. Consequently, at PMRT time country peculiar equipment does not transfer

to AFLC. Country peculiar equipment is really a fairly new problem which took a few years to evolve. When the US first got into the business of supplying arms to allied air forces, they sold or more often gave away obsolescent aircraft which were inferior to those in the USAF active inventory, e.g., the P-51 and B-26. In the 1960s the US started selling equipment identical to what the USAF was using, e.g., the F-100, F-101 and F-104. Now in the 1970s the allies can buy better equipment than the USAF has. The best example of this latest trend is the Iranian version of the RF-4E which will have the avionics package from the F-15. Clearly this is country peculiar equipment and AFLC will not support it.

The two fighter aircraft currently under the Security Assistance program are the F-4 and the F-5. The F-5 is a unique case because up to now it has been procured solely for allied nations. The F-4 however, is flown not only by the USAF, the US Navy and the Marines, but also by the air forces and navies of several allied nations. None of the country peculiar equipment on the F-4 has transferred to AFLC. It remains the responsibility of the F-4 SPO which means additional manpower at ASD to support relatively few items.

Another aspect of the problem with FMS involves the rights of allied nations to requisition spares from the AFLC managed depots. Although initial spares for foreign

customers are procured by USAF, AFLC is not authorized to procure additional spares based on anticipated demands from those foreign customers. This problem involves not only AFLC but also the using commands whose aircraft are NORS because the parts are used up by foreign customers. Even though this problem is not directly concerned with PMRT, it is a sore point with AFLC that can have a negative effect on PMRT negotiations.

The essence of the FMS problems lies in the planning function, specifically with the establishment of conflicting objectives by the Air Force, DOD, the State Department, and big business. The national objectives of the Security Assistance Program include national security, protection for allied nations, favorable balance of payments, increased American prestige abroad, and higher revenues for American aircraft manufacturers. The Foreign Military Sales Act states that the ultimate goal of the United States is "a world free of the dangers and burdens of armaments." (1:1) AFM 400-3 says that

Unless dictated by overriding logistics considerations approved by the Secretary of Defense, the Department of Defense will not enter into sales arrangements which entail commitments for Department of Defense procurements in foreign countries. (1:1)

The writer is unable to reconcile this stated policy with the F-16's offset agreement as discussed in the next chapter. It is very difficult for the Air Force to expect its program managers to adhere to strict cost, schedule and

performance constraints in such a politically and economically charged environment.



#### IV. PMRT Environment for the F-16

The preceding chapters have been concerned with PMRT from a historical viewpoint. The criteria set forth in Chapter Two were based on regulations and systems which pre-date the F-16. The problems discussed in Chapter Three were also based on the experiences encountered on earlier systems. Likewise, the correlation of criteria against problems was based strictly on the situation which existed prior to 1975. If there is to be progress in the PMRT arena, then the F-16 should learn from the problems which have plagued previous systems so that those effects can be eliminated or reduced.

The purpose of this chapter is to look at the current and near-future environment with respect to the factors that affect the PMRT process. The emphasis here will be on new regulations, organizational changes, contract provisions and to a limited extent the political situation. The research effort began under the belief that all of these factors had a potentially beneficial effect on the F-16's PMRT process. Further scrutiny of the details of some of the environmental factors reveals that some have a potentially detrimental effect. The next chapter will deal with some of the factors in a constructive fashion.

Inspector General's Findings

Several significant changes to the PMRT environment have occurred during FY 75, all of which could have important consequences for the F-16 transfer process. Some of these changes are a direct result of the findings by the AF IG team in their previously referenced report on the transition process. This report, which evaluated the transition process for both systems and equipment highlighted many of the problems which have hindered past transition attempts on other systems and equipment. Rather than reiterate the applicable findings of the IG, this paper will only refer interested readers to that report. Much of the IG report was based on interviews of personnel in both AFLC and AFSC. The writer himself was interviewed and some of his personal opinions were included in the report, apparently substantiated by other similarly interested personnel in both AFLC and AFSC.

Of itself, the IG report is only as authoritative as the reader perceives it to be. Several of the people interviewed (for this paper) had strong reservations about the validity of the IG's findings. Others saw it as a useful collection and listing of the ills of the transition process but did not necessarily accept the remedies. Some discounted it because of an apparent lack of continuity and the fact that the IG team set themselves up as experts on the subject.

It would be difficult to conduct a meaningful debate over the value of an independent review of the transition process. One would first have to decide if the IG review was truly independent considering their use of the interview. Such a value judgment is beyond the scope of this paper. More importantly, it is not really relevant because the IG team's findings do not form the basis for this paper. The real value of the report is that it served as the catalyst for at least one of the factors which contribute to the new PMRT environment.

AFR 800-4

AFR 800-4 dated 10 March 1975, "Transfer of Program Management Responsibility," is a direct result of the IG's findings. This new regulation defines PMR, PMRT and PMRTD and offers much more flexible guidelines for determining when PMRT will occur. It also dictates the establishment of a Transfer Working Group (TWG) for each program which has not yet transferred. As detailed in AFSC/AFLC Supplement 1 to AFR 800-4, the TWG will

. . . function as staff to the Program Manager before the PMRTD to prepare the PMRT plan and assure an orderly and timely transfer of PMR. Subsequent to the PMRTD, the TWG will function as staff to the AFLC SM/IM to track completion of residual tasks by AFSC.  
(5:4)

AFR 800-4 prescribes that PMR include all (engineering, funding and budgeting and management) responsibility for a program and that PMRT will occur at the

earliest practicable date during the production phase (4:1). It further protects against insufficient planning by requiring that the PMRTD be "determined via the TWG during the full scale development phase and forwarded to HQ USAF for inclusion in the production Program Management Directive (PMD)." (4:1) The Joint Supplement also contains a sample format and brief listing of the contents of the PMRT plan.

One of the important aspects of the new regulation is its delineation of the role of the SM. For a major system such as the F-16 the SM "is the AFLC focal point for all assigned programs" and will coordinate the plan with all affected IMs. It also requires the SM to forward the plan to HQ AFLC for staffing prior to approval and signature by the appropriate ALC commander (5:4-5). The situation, on paper at least, has not changed significantly as the SM still does not have authority comparable to the SPDs. Former AFLC commander General McBride in his 26 March 1975 letter to the ALC commanders stated that "There must be only one official AFLC spokesman for AFLC logistics management participation in each development and acquisition program" and that is the SM (29:1). It remains to be seen what authority the SM can garner based on the new regulation and the commander's letter.

SM/IM Reorganization

The role of the SM vis a vis the IM, the ALC commander and the HQ staff functions was one of the key problem areas discussed in Chapter Three. General McBride's letter and AFR 800-4 have not significantly altered the basic functional (commodity oriented) structure in AFLC. There is another piece of "legislation" which does affect the relationship of the SM with the other seats of power in AFLC, but this one could potentially reduce the SM's authority. It is called the "SM/IM Reorganization" and it is the result of an AFLC study of the Materiel Management function which was begun in January, 1974. The writer read a copy of the briefing which was presented first to the AFLC council and then to the Air Staff in March, 1975. The writer also interviewed two of the individuals who helped prepare the study: Mr. Jack Moore and Mr. Frank Carchedi of AFLC/MMXPE. The plan is currently awaiting HQ USAF approval.

The purpose of the study was to determine the feasibility of reducing the cost of the MM function through consolidation of organizational elements, a reduction of elements, and the potential for centralization of those functions that can be performed outside of the ALC environment, e.g., at HQ AFLC. The final proposal as briefed to the Air Staff contained several recommendations, some of which could directly affect the PMRT process. The primary

selling point of the plan is an immediate dollar savings realized by reducing the total AFLC manpower. Many of the jobs to be eliminated are IM positions. The proposal calls for an overall reduction of 396 IMs (fairly evenly distributed among the ALCs, , 168 of which are managers of stock fund items and the remaining 228 are managers of investment/replacement items. This reduction in IMs without a concomitant reduction in the number of items managed means that the average IM will be managing not 358 but 449 items, which is roughly a twenty-five percent increase. The writer believes that such a move toward increasing the IM's workload would be a negative inducement to accepting new items at PMRT time.

The reorganizational aspects of the proposal will have an equally significant effect on the PMRT environment. The plan calls for the establishment, within each ALC's DMM, of an Acquisition Division, an SM Division, an IM Division, an Engineering Division and a Resource Management Division. As Figure 1 portrays, there are some subtle differences between the current setup and the proposed one.

The most obvious difference is the creation of an Acquisition Division. This division would function much like an SM Division but it would only be for programs still in the acquisition phase. At some point in its life, the exact time to be determined by the ALC commander and HQ AFLC/MM, the system would move from the Acquisition Division

CURRENT (1 JUNE 75) ALC/MM  
ORGANIZATIONAL STRUCTURE

DIRECTOR OF MATERIAL MANAGEMENT

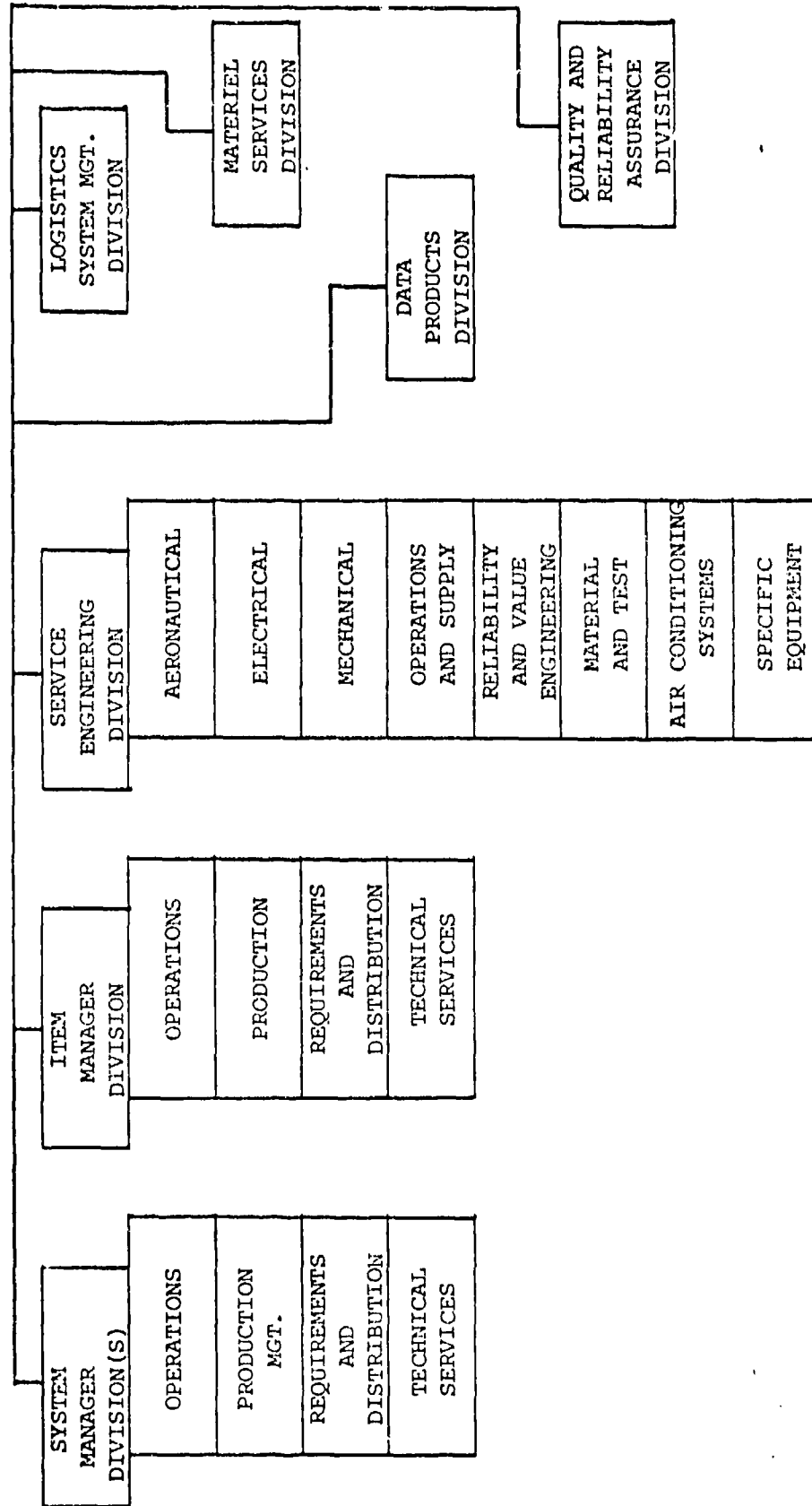


Figure 1. Current Versus Proposed ALC/MM Organization

## PROPOSED ALC/MM STRUCTURE UNDER SM/IM REORGANIZATION

## DIRECTOR OF MATERIEL MANAGEMENT

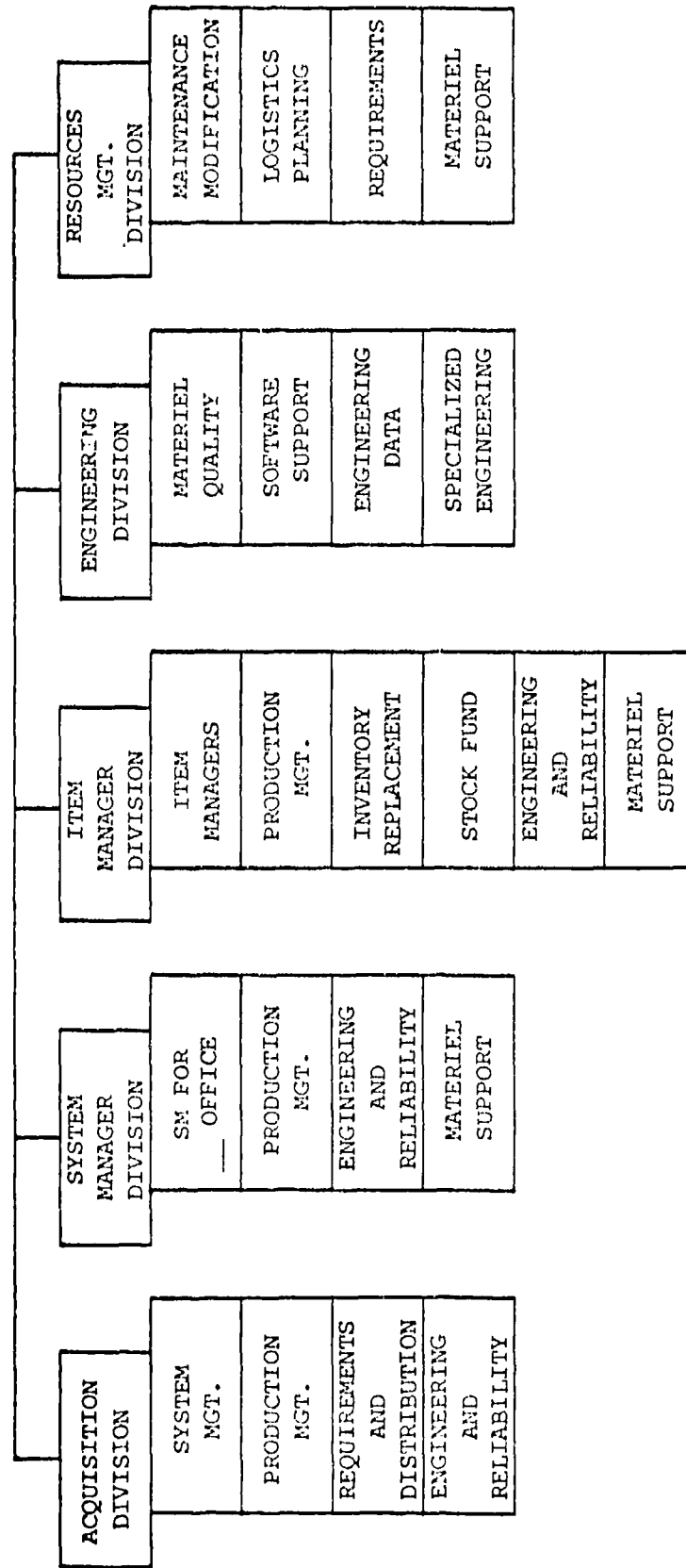


Figure 1. Current Versus Proposed ALC/MM Organization--continued



to the SM Division. Presumably it is at about the same time that responsibility within AFLC for the program "transitions" from AQ to MM.

One of the biggest changes proposed is in the make-up of the several divisions. Previously all engineers were assigned to the SED, but under this plan each SM, IM and Acquisition Division will have its own engineering capability. In fact, two-thirds of the engineers now assigned to SEDs will be reassigned to the other divisions and will be integrated with the technicians. Perhaps more importantly, the IMs who formerly were assigned to the SM Divisions are now being consolidated in a separate IM Division. Under the old arrangement the SM had direct control over those IMs who managed the major structural components such as the wing and fuselage. While the SM/IM Reorganization gives more control to the SM with regard to engineering, it simultaneously reduces his control over some of the key IMs. The final point regarding the proposed reorganization is that it places an additional body between the SM and the ALC commander. While the SPD of a major program reports to a three star general who in turn reports to the commander of AFSC, the SM will report to another colonel who in turn reports to another colonel who reports to a two star general who then reports to the commander of AFLC. Several of the people interviewed believed that the

net result of this reorganization could be a loss of power in the SM position.

#### Hq AFLC Staff Changes

The fourth major contributor to the current PMRT environment is the creation of a Deputy for Acquisition Logistics at HQ AFLC. As the name implies, this group is concerned with providing assistance to the DPMLs in matters regarding logistics management functions in the SPOs. As mentioned previously, the AQ organization is responsible for overseeing a new program until "transition" occurs within AFLC, at which time MM assumes the role. The DPML works for AQ insofar as they write his OER, but he still must work for the SPD in the SPO. And of course he must stay attuned to the ALC chain of command since he will work directly for them once "transition" occurs. The net result from a unity of command perspective is that the DPML/SM still has more than one boss.

#### DPML/SM is One Person

The letter from General McBride to his ALC commanders spells out the general policy for the location and duties of the DPML/SM. Just as it appears, the DPML and the SM are one and the same person. The DPML/SM will reside in the SPO until such time as the ALC/CC and the SPD determine it is advantageous to transplant him to the ALC. The DPML/SM will have a civilian assistant at the ALC

(probably still in the Acquisition Division) and assistant DPML in the SPO, both of whom report directly to him (29:1-2).

Although the F-16 will be the first program to come under these policies and regulations so early in the full scale development phase, other older programs have been subjected to specific parts of the new PMRT environment. The B-1 and the A-10 programs were specifically addressed in General McBride's letter and both will have a DPML/SM at ASD since neither is deemed ready for "transition." (29:attch.) The F-15, which is well into the production phase, is in a unique position regarding the new environment. Colonel Homer Terry is the F-15 DPML/SM and stated that he has received excellent support from the people in the SM division at Warner Robins ALC while he was still at ASD. Colonel Terry never worked for AQ because AQ was created after the F-15 would have "transitioned." Likewise, the F-15 will not have a unified PMRT, but instead will follow the old system and have an RMB in July, 1976 and aim for transfer of AFER and management responsibility on 1 January 1980. But Colonel Terry is the first DPML/SM to physically move from ASD to the ALC.

Colonel Terry stated that he thought July, 1975 was a good time to make the move because the emphasis in logistics support had shifted to the ALC and the SM Division. It may turn out to be significant that he made

his move more than a year before any of the transfers of responsibility is scheduled to occur. It is also significant that Colonel Terry expects to become the Acquisition Division chief instead of the F-15 Office chief in the Acquisition Division. The ramifications of this nuance will be considered in the next chapter.

#### Realignments Within AFLC

Before going into some of the contractual provisions which might affect PMRT, it should be instructive to recap the various movements of people and responsibilities within AFLC that are likely to be confused with PMRT. They are presented in approximately chronological order. First, there is "transition," an unfortunate choice of wording in the writer's opinion. "Transition" refers to the changeover from AQ to MM in HQ AFLC of the DPML/SM function. Second, there is the physical relocation of the DPML/SM person from ASD to the ALC. Most likely he will go to the Acquisition Division. Third, there is the functional movement of the system from the Acquisition to the SM Division at the ALC. The writer was unable to discover if the movement also included all the personnel or just the function. Apparently it is at the discretion of the ALC commander with help from AFLC/MM. Finally, there is PMRT which is strictly a movement of the management function to AFLC from AFSC. By the time PMRT occurs, the DPML/SM should be

located physically in the SM Division at the ALC. Even so he is still the DPML as well as the SM.

Up to this point the discussion has been of regulations and policies that contribute to the current PMRT environment and are applicable to any new system. The next two items are peculiar to the F-16 and are not general guidelines but integral parts of the AF's contract with the prime contractor, General Dynamics.

#### Foreign Military Sales

The first of these contract provisions concerns the FMS program for the F-16 and specifically the consortium arrangement. Four NATO countries, Norway, Denmark, The Netherlands and Belgium have signed an agreement with the United States whereby the five nations are a consortium to build F-16s. It is a complex agreement containing an intricate offset agreement in which the United States agrees to buy a significant amount of parts for the F-16 from the consortium. According to Mr. Charles Combs of AFLC/MMI such offset agreements are not uncommon to sweeten a deal with a foreign customer, but never before has it been applied on such a magnitude. Nor do the parts being purchased usually go on the system, in this case the F-16, but normally just consist of some other military equipment. The configuration management and accounting of all these parts is of course an AFSC responsibility, but at PMRT time it will devolve to AFLC. As mentioned in Chapter

Three, data is one of the historical hangups at transfer negotiations. There is also the possibility of country peculiar equipment entering the system. The writer believes that the situation is conducive to fouling up the PMRT process.

In addition to the aircraft produced by the consortium, there will very likely be sales of F-16s to other friendly nations under the Security Assistance Program. Here again the country peculiar equipment could easily become an issue at PMRT negotiations. So long as AFLC's functionally oriented structure requires an IM to manage each piece of equipment and their cost accounting system can't accurately determine costs of maintenance for each aircraft, the chances of transferring country peculiar equipment are slim.

#### Contractual Life Cycle Cost Provisions

The second contract provision which could affect PMRT concerns Life Cycle Costing (LCC). Specifically the F-16 contract contains alternatives which the government can select which are intended to minimize the total cost of ownership of the F-16 fleet over its projected lifetime. The three alternatives are "a contractor commitment to a Target Logistic Support Cost (TLSC), a Reliability Improvement Warranty (RIW) and an RIW with guaranteed mean time between failure (RIW/MTBF)." (24:1) These provisions apply

only to certain types of equipment which are designated control First Line Units (FLU) or the modules which comprise these FLUs.

The way the contract is worded, the government has the option of selecting either of the RIW provisions or none. The TLSC concept is an integral part of the contract. Essentially the TLSC clause states the contractor's performance is incentivized with respect to TLSC for the control FLUs. The contractor's fee will be affected by how well these FLUs conform to advertised LCC models. The RIW options are more complicated. Greatly simplified, they are a means of improving the reliability of the control FLUs by paying a higher acquisition cost in the hope of achieving a lower TLSC. The contractor must replace or repair any of the covered equipment which fails during the warranty period, which is forty-eight months or 300,000 force flying hours. The Government has an option of renewing the warranty for two-year increments. The RIW/MTBF option further specified that the equipment must exceed a threshold MTBF to be computed at six-month intervals (24:7-10).

The possible effects that the RIW options could have on PMRT are numerous and some are rather subtle. First, the contract for the options would be managed by AFSC and would probably be production money (24:95). Hence the contract would remain with AFSC according to Joint

Supplement 1 to AFR 800-4 (5:7). If PMRT occurred during the four-year warranty period, the control FLUs would most likely be exceptions to transfer although they would probably be among the most stabilized in terms of reliability. Along these lines, AFLC would have to decide whether to extend the warranty coverage or develop their own depot level AGE. The biggest potential impact on PMRT might be in the area of configuration control. According to Captain Briggs of the F-16 SPO, the FLUs covered by the warranty must be tracked by serial number. Also the contractor is allowed to make whatever changes he needs to get the boxes to work, but he must update the boxes prior to turning them over to the AF. Finally, the consortium nations may not want the warranty features which raises all kinds of possibilities regarding configuration accounting, spares provisioning and AGE requirements. The writer believes that the TWG must do a lot of preparation prior to PMRT if the RIW options are exercised.



## V. Conclusions, Alternatives and Summary

The purpose of this final chapter is three-fold: to present some conclusions which logically follow from the analysis, to offer some alternative solutions and recommendations, and to briefly summarize the entire research effort. The first section is a listing of the conclusions based on the material in Chapters Two, Three and Four. The conclusions are numbered for ease in referencing and are in approximately chronological order with respect to their mention in the preceding chapters. They are not prioritized.

### Conclusions

(1) It is difficult to isolate the problems of transition/PMRT from the myriad of problems which exist at the working interfaces between AFLC and AFSC. Consequently, solutions to transition/PMRT problems might depend on or could influence the degree of cooperation between the commands in other areas.

(2) Many of the problems relating to transition can be directly attributed to violations of the basic principles of management: planning, organizing, actuating (directing) and controlling.

(3) One of the keys to problems encountered in past transition events is the fact that the transfer of

responsibility is from a systems oriented management structure (AFSC) to a functionally oriented one (AFLC). One of the consequences of this difference in management structures is that the SPD has much more control or authority over the program than the SM does. The structural and procedural differences (between AFSC and AFLC) contribute to the inability of the personnel in either command to fully appreciate the "other guy's" problems and constraints.

(4) The PMRT environment for the F-16 will be significantly different from the environment which existed for any system transitioned prior to 1975. As the subparagraphs will show, not all the changes in the environment are necessarily going to enhance PMRT for the F-16.

(a) AFR 800-4 and the joint AFSC/AFLC Supplement 1 are better than the regulations which they supersede because they encourage an earlier transfer of PMR. PMR now includes all responsibilities for a program, the PMRTD is set early and is not easily changed, and the planning process for PMRT is controlled by a TWG which facilitates communication between AFSC and AFLC.

(b) The SM/IM Reorganization plan, if approved, could reduce the effectiveness of the SM by removing the IM's from the direct control and also from the placement of an additional person in the chain of command between the SM and the ALC/DMM. It could increase his control over many of the engineers who were all formerly located in the SED.

(c) General McBride's letter should increase the SM's authority relative to the IM's and the HQ AFLC staff organizations but the exact extent of such an increase is difficult to predict.

(d) The new Deputy for Acquisition Logistics (AFLC/AQ) could have a positive influence on the PMRT process for the F-16 if he limits his involvement to staff functions, e.g., general policy recommendations, and only intervene in the PMRT process at the specific request of the DPML/SM.

(e) The several movements of people and offices and authority within AFLC in conjunction with PMRT provide a potential source of confusion to the personnel in AFSC, AFLC, HQ USAF and the using command(s). These changes include the movement of the DPML/SM from ASD to the ALC, the "transition" of responsibility from AQ to MM within HQ AFLC, and the relocation of the program office from the Acquisition Division to the SM Division at the ALC.

(f) If AFSC accepts either the RIW or the RIW/MTBF options in the production F-16 contract, those FLUs covered by such warranties could easily become exceptions to PMRT which might violate the intent of the residual task definition.

(g) The consortium agreement is a potential source of immense friction between the two commands over

issues of country peculiar equipment and spares requisitioning.

(6) The personnel interviewed were professional, knowledgeable and loyal to the Air Force. They were all vitally interested in the success of PMRT although most did not consider it to be a panacea. Many of them were appreciative of the chance to express their views on many subjects, many of which did not bear directly on the problem of transition/PMRT.

#### Alternative Solutions

The second section of this chapter is a discussion of some alternative solutions and some suggestions/recommendations for the F-16. Many of the suggestions are merely personal opinions from the people the writer interviewed. They are included here because they come from people who are perhaps the most knowledgeable and most familiar with the current problems facing PMRT for major aircraft programs. All of the people interviewed have been or are currently involved in PMRT planning for the first-line USAF aircraft of the next fifteen to twenty years.

The alternatives/recommendations are numbered for ease of organization, but the numbers do not correspond necessarily to the conclusions of the previous section. They are not prioritized.

(1) Over 90 percent of those interviewed strongly recommended that the SM be given more authority over the AFLC elements which directly support his system. In terms of the PMRT agreement, the DPML/SM should truly represent all of AFLC. With regard to budgeting and funding, the SM should have the means to procure items and equipment which are peculiar to his system.

(2) It is imperative that managers at all levels in both commands encourage their subordinates to understand and appreciate the "other guy's" problems, and especially his limitations caused by the way his command does business.

(3) The members of the TWG should give themselves the job of helping to "spread the PMRT gospel." Under the old system there was much confusion as to the status of transition because AFER, management and funding transferred piecemeal. PMRT will only be effective if everyone knows its provisions and accepts the principle of selecting a PMRTD well in advance and then working hard to meet that date. There must be positive motivation from all levels of management or else PMRT will be no more effective than its predecessors.

(4) The subject of engineering transfer requires additional attention. The new Supplement 1 to AFR 800-4 supersedes much of AFSCR/AFLCR 80-17 in the area of engineering transfer, but AFLC must publish some guidance on the exact procedures and requirements for determining what

is and what isn't a valid candidate for a residual task. HQ AFLC must also decide what the roles of AFLC/MME and the SED's will be in the PMRT agreement approval. Because AFER is the key part of PMR, care must be taken to insure that the number of residual tasks is kept to a minimum.

(5) The problems associated with FMS must be resolved quickly because the success of the entire F-16 program is intimately related to the success of the consortium agreement.

(6) It has been recommended at various times by different parties to merge the two commands into a super command. This would automatically eliminate all inter-command transfer problems. However, if development continued to be done on a systems oriented basis and support on a functionally oriented one, this recommendation would not address the gut issue as presented in conclusion number four. It might also result in a command so large that a single individual could not effectively command it.

(7) One of the more radical suggestions is to not transfer AFER, which would be in effect a return to the pre-1961 era when AFLC (then AMC) had no organic engineering capability. If it were possible to discuss the various responsibilities which make up PMR separately and independently, then there might be some good arguments for not transferring AFER. But, as was emphasized in Chapter Three, AFER is the heart of PMR and the organization with

AFER truly controls the system. Therefore, under the assumption that AFLC will continue to be the supporting command for every system eventually, and that it must have PMR to perform its support function properly, it is not possible to allow AFER to stay with AFSC and still expect the SM to effectively manage the system.

(8) An alternative which combines the best parts of the two preceding suggestions is to create an independent program office. This organization would be composed of members from both AFSC and AFLC and would exist for the life of the system from conception through deployment to the boneyard. In the beginning the personnel mix would favor AFSC although the deputy SPD would always be from the other command as the SPD. As the system matured the mix would shift until at the time of deployment the program office would be predominantly AFLC type people. The organizational structure would more closely resemble a SPO than an SM division, and this organization would have PMR for the life of the system. An adjunct to this idea is to locate this joint program office at the prime contractor's plant.

#### Summary

The purpose of this thesis was to examine the transition/PMRT process for previous major aircraft programs and apply some of this experience to the F-16 transfer

process so that the F-16 can avoid or minimize the effects of problems which have plagued those previous systems. During the course of this examination the writer expected to uncover some outright blunders, some examples of bad judgment, perhaps some apathy among the working troops, and certainly some deep rooted enmity between the two commands. While the conclusions show some definite problem areas the writer did not uncover the types of problems listed above. He did find loyal, dedicated personnel in both commands who sincerely want PMRT to work smoothly, but who also have some definite and sometimes diverse opinions about how it should be done.

Past problems were in the main caused by neglecting to apply sound management fundamentals. The planning and organizing functions were slighted in many key areas, and because these functions must precede the other management processes, failures to plan and organize correctly could not be overcome even by the highly qualified personnel who manage programs in AFSC and AFLC.

The F-16 has, in the writer's opinion, a better chance of successfully navigating the waters of PMRT because of several changes which were made recently and whose net effect is to alter the PMRT environment. Care must be taken, though, to recognize the few changes which could have a potentially harmful effect on the F-16 PMRT process and keep these changes from driving the system. For the



most part, though, the changes will aid the F-16 TWG because the changes affect the basic planning and organizing functions.

The key to success for the F-16 PMRT will be the willingness of the personnel in both commands and at all levels to work towards a common purpose: effective and efficient transfer of PMR. Money and talented people are the only two assets available to the Air Force for solving problems. It seems foolish to squander either of them. PMRT is not a simple task which will take care of itself if left alone, but neither should it become so enmeshed in politics that long term objectives are sacrificed. PMRT can be accomplished effectively and efficiently by the current crop of personnel. To thwart their actions by incorporating unwieldy and inappropriate organizational structures and policies is a waste of the taxpayers' dollars.

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Appendix

List of Persons Interviewed

Mr. Vaughn Anderson: HQ AFLC, Deputy Director of Service Engineering.

Mr. Arthur Boykin: HQ ASD, Technical Director.

Lt. Col. Charles Coogan: Formerly F-111 SPO, DPML; formerly F-111 SM Division, FB-111 SM.

Mr. Keith Dumas: F-4 SPO, Ogden ALC Representative.

Col. William Egan: HQ AFLC, Director of Service Engineering.

Col. E. C. Hamilton, Jr.: F-111 SPO, Director.

Lt. Col. George Henningan: B-1 SPO, DPML.

Col. J. E. Hildebrandt: B-1 SPO, Deputy Director.

Mr. John Hyson: HQ ASD, Logistics Management Specialist.

Mr. Jack Keating: F-15 SPO, Technical Director; formerly F-111 SPO, Technical Director.

Lt. Col. Robert Kellogg: Formerly F-111 SPO, Chief of Configuration Management Division.

Maj. William Lamb: A-10 SPO, PMRT Project Officer.

Col. Robert Lea: HQ ASD, Assistant Deputy for Systems; formerly F-111 SPO, Deputy Director; formerly F-111 SPO, Chief of Test and Evaluation Division.

Lt. Col. George Livie: F-4 SPO, Chief of Program Control Division.

Mr. Jack Moore: HQ AFLC, Chief Resource Management Branch (MMXPE).

Lt. Col. Robert Quinn: HQ AFLC, Chief of Technical Integration Division (AQML).

Maj. F. D. Ruth: C-5A SPO, DPML.

Lt. Col. Robert Schaiff: HQ AFLC, Chief of Engineering Support Division (MMEP).

Lt. Col. James Stempson: HQ AFLC, Chief of Programs and Policies Division (AQMP).

Col. Homer Terry: F-15 SPO, DPML/SM.

Lt. Col. Ralph Zimmerman: A-10 SPO, APML/SM.

Vita

Captain John D. Rominger was born in Indianapolis, Indiana in 1946. He graduated from the United States Air Force Academy in 1968 with a Bachelor of Science in Engineering Sciences degree. His initial assignment was with the Office of the Secretary of the Air Force, Directorate of Special Projects, as a Software Management Engineer at Los Angeles Air Force Station, California. From September, 1972 until September, 1973 he served with the Aerospace Defense Command at Shemya AFB, Alaska as a Sensor Space Surveillance Officer. His next assignment was with Air Force Systems Command, Aeronautical Systems Division, Wright-Patterson AFB, Ohio as a Logistics Management Engineer in the F-111 System Program Office. In June, 1974 he entered the Air Force Institute of Technology, School of Engineering, in the Graduate Systems Management program. His next assignment will be in Aeronautical Systems Division.

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